



INDIAN FISHERIES BULLETIN



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CFTRI-MYSORE
4619
Indian fisheries.

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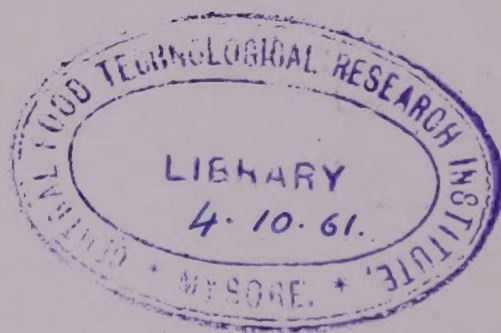
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INDIAN GENERAL AND DEVELOPMENT

Marine

(i) Progress of the Indo-Norwegian Project for the six months period ending September, 1959.

Fisheries Section

Experimental fishing from the fishing vessels M/V "Ashtamudi", "Flying Fish" and I.N.P. Medium boats with purse seines, otter trawls, shrimp trawls etc., was continued at Cochin and Quilon. During April to June, 1959, the total catch from Project boats and M/V "Flying Fish" and "Ashtamudi" at Cochin was 92,749 kgs. of fish valued at Rs. 67,953. The catch of six 22' mechanised boats was 788 kgs. of fish valued at Rs. 280. While 5,692 small canoes landed 1,47,118 kgs. of fish valued at Rs. 59,958. The four medium boats during experimental-commercial fishing landed fish of value of Rs. 55,641. The maintenance and capital cost was Rs. 47,635. The calculated profit was Rs. 8,006.

Under the boat building programme, carpentry work of twenty-six 25' I.N.P. boats was completed and work on nine new 25' I.N.P. boats and 23½' boat was in progress.

Repairs and maintenance of I.N.P. boats, M-Boats and M/V "Ashtamudi", "Flying Fish" and "Conch" and over-hauling of electronics and electrical equipment of medium boats and vessels were undertaken. Extensive repairs were continued on R/V 'Kalava' at the Cochin Harbour Dry Dock. Repair work on 15 mechanised boats issued to the fishermen was also undertaken at the Boat Yard and material and spare parts have been issued to 32 boat owners.

At the Refrigeration Plant 42 kgs. of fish and 4260 kgs. of prawns were received and 7442 kgs. of fish and 431 kgs. of prawns were issued during April to June, 1959 and in July-September period 4499 kgs. of frozen prawns were sold mainly in the high range markets. 4,67,900 kgs. of ice was produced during the period and 71,025 kgs. of ice was sold during July-September.

Construction of diesel pump and tank at the Refrigeration plant was completed.

Under the marketing scheme 6199 kgs. of frozen fish and prawns were marketed. At Cochin 14,226 kgs. of fresh fish and 73,414 kgs. of prawn were sold at a total value of Rs. 63,927 during the quarter April to June, 1959.

Mr. Knut Allsvag joined the Project as Marketing Expert and initiated investigations on markets in High ranges and prepared plans for organised marketing as for new scheme for 1959-60.

The next course of Fishermen Training was started with a batch of ten trainees recommended by the Primary Producer Fishermen Cooperative Societies. The 4 trainees and a fishery officer of Orissa State completed their training in Purse-seining and 3 trainees from Andhra Pradesh started the same training at Cochin.

Beach landing trials continued in the Project area. R/V 'Kalava' 'Flying Fish' and 'Conch' continued exploratory operations on the West Coast off Cochin, Quilon and Trivandrum during April to June. Hydrological and planktological Cruise was executed by R/V 'Kalava'.

Health Section

Routine clinical work was carried out as usual. 1494 children were tubercular tested and 995 have been B.C.G. vaccinated and 65 children were vaccinated against small pox. Nutrition class was organised and instructions were given at the family planning centre. Other sanitary and social work was also continued.

At the Pipe Factory 1034 Premo pipes and 216 low pressure pipes were produced. The total number of Premo pipes and low pressure pipes manufactured since October 1956 was 5,448 and 1052, respectively. The Pipe Factory was handed over to the Government of Kerala, Public Health Engineering Department on 18th September, 1959.

Administrative Matters

Norwegian expenditure in Norway during the period was Rs. 9,10,800 and in India it was Rs. 6,14,785 while the progressive total of Norwegian expenditure since inception amounted to Rs. 205,81,600.

The Indian expenditure was Rs. 1,68,218 and the progressive total of Indian expenditure was Rs. 20,66,284.

Revenue realised and remitted during the period was Rs. 95,412.

(ii) Proceedings of the sixth meeting of the Standing Fisheries Research Committee held on the 2nd, 3rd and 4th April, 1959 at Trivandrum.

The 6th meeting of the Fisheries Research Committee was convened by the Ministry of Food and Agriculture on the 2nd, 3rd and 4th April, 1959 at Trivandrum at which the following items were discussed and resolutions were adopted.

I. Technological Research in connection with (a) Fish Curing; (b) Fish Preservation by refrigeration; (c) Storage containers and Transport of fish; (d) Fish Oils, Fish flour, fish sauce, etc.

(a) Fish Curing:

(1) Further work on the quality of salt as affecting the quality of cured fish with special emphasis on the NaCl, Ca & Mg contents should be continued at the various research laboratories.

(2) Improvement of curing practices at present being adopted in the various parts of the country, with reference to improvement in the design of premises, method of drying, proportion of salt to lean and fatty fish during different seasons should be continued with increased tempo.

(3) Quality standards should be developed for the various cured products taking into consideration all aspects of the industry.

(4) Systematic studies on the shelf life of cured products under various conditions of storage should be carried.

(5) Work should be undertaken on the design of suitable packages, both large scale and small scale, from indigenous material in order to improve storage and develop distribution.

(6) Studies on the use of chemical preservatives as aids in the curing practices should be undertaken.

(7) Studies on pickling with Gorakepulli (*Garicinia*) and other suitable materials for curing different varieties of fish, with respect to preservation and taste should be continued.

(8) Studies on the methods of assessment of quality of cured products shall be given high priority.

(9) Work on objectives evaluation of the quality of fresh fish and shell fish should be undertaken immediately.

(10) Studies on the utilization of indigeneous Scombroids for production of "Masmeen" may be undertaken.

(b) *Fish Preservation by Refrigeration*

1. Freezing, chilling and increased production of ice are all of equal importance, though more emphasis in the present stage of development of our country will have to be placed on increased production of ice and chilling of fish. Work should also be undertaken on freezing both large and small commercial varieties of fish paying attention both to the technological and economic aspects.

2. Bio-Chemical work both of applied and fundamental nature on the changes occurring during frozen storage of fish should be carried out in the various laboratories which have facilities.

3. Some studies on the antibiotic and other chemical ices have already been undertaken in some of the laboratories. This problem, which holds out great promise for fish preservation by icing, must be tackled with increased tempo at the respective laboratories.

(c) *Storage, Containers and Transport of Fish*

Central Food Technological Research Institute, Mysore, may carry out further investigation for evolving methods whereby the use of local materials like gunny pith, groundnut shells and rice bran as insulating material to reduce the meltage of ice could be employed during transport.

(d) *Fish Oils, Fish Flour, Fish Sauce etc.*

Shark Liver Oil

Considering the demand for shark liver oil in the country, the committee recommends that steps should be taken to increase the production of raw shark liver oil and attention should be paid to the designing and development of improved extraction units which could be installed at various fishing centres.

For better consumer acceptance the removal of fishy odour from the oil has special importance. The committee recommends that the work on de-odourisation and molecular distillation of shark liver oil be taken up on a large scale and facilities afforded for acquisition of latest machinery for this purpose.

The present specification for shark liver oil laid down in the Indian Pharmacopoeia needs revision in consultation with the manufacturing organisation. Appropriate steps may be taken on this question in consultation with the Ministry of Health.

Fish Oil

The Committee recommends that urgent steps should be taken to improve and modernise the methods of production of Sardine Oil at the various small units with a view to producing a fish body oil which will fetch a better price for the product and which will make it suitable for further processing.

With a view to the collection of more data about the fatty acid composition of sardine oil required for assessing its use in industry, the committee

recommends that the cooperation of University and other institutions may be sought and samples of oil from various regions may be arranged to be tested for this purpose.

In view of the demand for hydrogenated fish oils from foreign countries, the committee recommends that the possibility of hydrogenating this oil may be explored and facilities afforded for any project proposed in this connection so that the large quantities of fish oil produced may fetch good foreign exchange.

Fish Flour and Fish Sauces.

The modern methods involving the use of solvents for the preparation of de-odorised and defatted fish require large quantities of raw materials for economic exploitation. Work already undertaken at the Central Fisheries Technological Research Station on the fermentation process is therefore of great importance in view of the limited availability of raw material in this country. The Committee, therefore, recommends that this work should be pursued actively, and a Pilot Plant with a capacity of at least 100 lbs. of fish flour per day should be set up at the Central Fisheries Technological Research Station. The Plant should be worked for a period of at least six months to collect data on the economics of the process, quality of the product and the reproducibility of the results.

Sufficient quantities of fish flour should be supplied to the Central Food Technological Research Institute, Mysore for studies on its nutritive value and its use in processed foods.

It is recommended that research work on the production of fish sauces should be conducted in different centres both in the East and West Coasts of the country, keeping in view regional consumer preferences.

Studies on the improvement in the quality of semi, hard-dried and canned prawns should be pursued.

II. Review of work on Paddy-cum-Fish Culture.

The Committee having reviewed the progress of work on paddy-cum-fish culture reported after the 5th meeting at Srinagar, recommended that:—

- (a) Paddy-cum-fish culture work in Bihar be intensified and field trials extended to privately owned paddy fields;
- (b) the economic aspects of the venture be carefully worked out and details made available to the committee.
- (c) Experiments at various centres where facilities are available be carried out on the possibilities of using fishes other than Major Indian Carps for cultivation in paddy fields; and
- (d) Possibilities of utilising paddy fields as an environment for rearing fry of carps be examined by carefully planned experiments.

III. Review of work on Exotic Fishes Viz. (a) Common Carp *Cyprinus carpio*, and (b) *Tilapia*

*(a) Common Carp, *Cyprinus carpio**

Considering the experimental results obtained at Cuttack on breeding and growth of *Cyprinus Carpio* and in view of the breeding of the fish in confined waters even at low altitudes and its comparatively rapid growth, the committee recommends that the State Governments may consider introduction of the fish into culturable waters, wherever necessary. Further, in view of the possibilities of producing appreciable quantities of fish-seed as a second crop in

fish seed centres, the Committee also recommends that the State Governments may attempt breeding of the common carp so as to supply fish seed for stocking purposes. Intensive research should continue on nutrition, growth, compatibility with other species, breeding and hatching techniques of the species in the Central Inland Fisheries Research Sub-Station at Cuttack and if possible at other centres.

(b) *Tilapia*

1. Reviewing the present status of the culture of *Tilapia* the committee recommends that this exotic fish should not be introduced in areas other than those where it has already been permitted.

2. The Committee, however, recommends that further investigations may be undertaken in the areas where *Tilapia* has been introduced in respect of the following:—

- (i) Culture of *Tilapia* as forage fish.
- (ii) Improved techniques for the culture of *Tilapia*.
- (iii) *Tilapia* culture in paddy fields.
- (iv) Genetical studies with a view to evolving better strains of culturable species.

3. The Committee recommends that the last item of research may be taken up by the universities.

IV. Review of work on Induced spawning of Major Carps by Pituitary Hormone Injections

The Committee notes with satisfaction the work that has been done during the last season, but feel that the work should be further intensified during the coming season and that a further group of persons should be trained during the coming spawning season in the practical methods of work.

Further researches should be carried out to standardise

- (a) doses,
- (b) Use of glandular extracts other than fish pituitary, and
- (c) Use of substances other than hormones.

The unit conducting this work should be strengthened for making the work effective and that the work done by Dr. Ramaswamy should extend to Major Carps.

V. Review of recommendations of the previous meeting of the Standing Fisheries Research Committee

The following action was proposed:

1. Assam Government may be requested to exterminate the *Tilapia* introduced in Assam waters contrary to the views expressed by the Committee.

2. Andhra Pradesh Government may be asked not to start any experiments on *Tilapia* if no work has been started so far.

3. Madras Government, Central Marine Fisheries Research Station, Mandapam Camp, and Kerala State may be requested to furnish reports on the progress of work done in connection with *Chanos* culture in pursuance of the recommendations of the Committee at the 2nd meeting.

4. The Secretary should request the Inter-University Board for full information on research in Fisheries being carried out in the universities and States for dissemination to Members.

VI. Research on Prawns and Lobsters

The Committee takes note of the importance of the problem and requests the Chief Research Officer, Mandapam to arrange for the study of problem of reduction in size or depletion of lobsters in Kerala and examine whether any conservation measures were necessary such as close seasons etc. This subject should also be kept constantly under review. Observations should also be made on the back water species of *Palaemon* in various places where they form fisheries. This could be taken up both at the Marine and Inland Fisheries Research Stations.

(iii) Government of India's Deep Sea Fishing Station, Bombay, Cochin and Tuticorin

During the period from April, 1959 to September, 1959, the exploratory fishing operations of the Government of India, Deep Sea Fishing Stations are as follows:—

Name of Vessel	No. of days absent from port	Qty. of caught	fish	Catch per absence	day's	Value realised
		Tons	Cwt.	Lbs.	Tons. Cwt. Lbs.	Rs. nP.
<i>Cochin</i>						
M. T. "Ashok" and "Pratap" . . .	33	123	15	42	3 15 1	22943.35
M. L. "Durga" . .	43	23	0	37	0 10 79	6504.91
M. V. "Tarpon" . .	37	25	16	109	0 13 109	6319.99
M. V. "Samudra" .	34	12	0	23	0 7 7	2881.36
<i>Tuticorin</i>						
"Sardinella" . . .	32	5	6	18	0 3 36	2803.97
"Sagar Sundari" . .	45	4	12	44	0 2 12	2341.12
"Sagarkumari" . . .	91	6	10	91	0 1 18	2085.30
"Meenalochani" . .	35	0	4	80	0 0 15	181.42
"Meenakshi" . . .	82	4	17	76	0 1 21	3356.32
"Gudjon"	23	1	6	81	0 1 18	485.61
<i>Bombay</i>						
M. F. V. "Bangada" .	21	6	10	2	0 6 20	1839.00
M. L. "Jheenga" . .	59	39	1	90	0 13 27	12031.87
M. L. "Meera" . . .	22	9	17	1	0 8 107	972.44
M. L. "Sagar Kanti" .	25	5	14	98	0 4 67	1274.45
M. L. "Pravasi" . . .	47	15	14	66	0 7 16	4848.45

(iv) The landings of four bull trawlers of New India Fisheries Ltd. Bombay for the half year ending September, 1959 are as follows:

Name of the vessel	Period of voyage	No of days absent from the port	Qty. caught (tons)	Catch/ days absence (tons)	Depth Fished (Metres)
'Arnala' and "Paj"	6-4-59 to 17-4-59 .	12	75	6.25	25—64
	19-4-59 to 29-4-59 .	11	66	6.00	29—58
	No Fishing operations up to 24-8-59				
	25-8-59 to 3-9-59 .	10	58	5.8	41—56
	5-9-59 to 15-9-59 .	11	56	5.09	45—50
"Satpati" and "Pilotan"	16-9-59 to 26-9-59 .	11	65	5.9	30—55
	29-3-59 to 11-4-59 .	14	75	5.36	27—40
	13-4-59 to 23-4-59 .	11	72	6.54	25—36
	1-5-59 to 11-5-59 .	11	65	5.9	38—70
	12-5-59 to 22-5-59 .	11	66	6.0	41—71
	24-5-59 to 5-6-59 .	13	58	4.46	49—71
	6-6-59 to 15-6-59 .	10	62	6.2	48—57
	17-6-59 to 28-6-59 .	12	61	5.08	51—70
	30-6-59 to 12-7-59 .	14	57	4.07	49—68
	13-7-59 to 24-7-59 .	12	52	4.33	50—68
	25-7-59 to 1-8-59 .	8	44	5.5	48—65
	3-8-59 to 14-8-59 .	12	51	4.41	49—59
	15-8-59 to 26-8-59 .	11	7	6.81	46—58
	27-8-59 to 5-9-59 .	10	7	7.2	45—59

(v) The Government of India Quick Freezing and Cold Storage Plant at Bombay

During the period from April, to September, 1959, the income realised from (1) sale of ice, (2) hire charges of cold storage accommodation, (3) basket storage of fresh fish, and (4) freezing of fresh fish are as follows:—

Activity	Value realised
(1) Sale of ice (1837 tons, 16 cwt 83.5 lbs)	Rs. 59,273.92
(2) Hire of cold storage accommodation	Rs. 28,218.00
(3) Basket storage of fresh fish	Rs. 10,548.83
(4) Freezing of fresh fish.	Rs. 1,713.00

(vi) Statewise break-up of the quantity of sea-fish landed and average price per ton paid to coastal fishermen during 1958

	Quantity in Metric tons	Price per ton (Average in Rs.)
1 West Bengal	2,224	292.00
2 Orissa	4,392	500.00
3 Andhra	28,846	500.00
4 Madras	1,18,056	844.44
5 Pondicherry	—	463.75
6 Kerala	2,95,135	360.00
7 Mysore	80,242	319.00
8 Bombay	2,26,787	225.00
9. South Andamans	92	1,120.00

VII. Statistics on fisheries in Madras State during 1958

1. Number of fishing vessels operating

Mechanised boats	42
Non-mechanised boats	4,731
Catamarans	23,200

2. Number of fishermen engaged in the industry

Marine fisheries	63,100
Inland fisheries	
(i) Part-time	4,500
(ii) Full time	12,700

3. Fishing methods used together with cold storage and processing facilities

Fishing was carried out by fishermen using the mechanised and non-mechanised boats and catamarans together with different nets like boat-seine nets, drift nets, gill nets, shore seine nets, Cast nets, drag nets, stationery nets and hooks and lines.

There is one cold storage at Madras for fish. There are 19 fish curing yards in the State. Wholesome salt is supplied to the curers at subsidised cost. The fish cured in these yards is supervised by the yard staff, so that the curing may be carried out under hygienic conditions.

4. Statistics of production of fish and its utilization

The production of fish in 1958 was—

Marine fish	71,820 tons
Inland fish	40,400 tons

Out of the total marine fish caught it is estimated that 64% of the fish caught is consumed fresh. 34% is cured with salt and 2% is iced for consumption in interior places.

5. Trade in respect of species of major economic importance

The major quantity of fish produced is consumed in the fresh condition and the rest is cured. The fresh fish is sold in the local markets at the production centres or in the interior places where transport facilities are available. The cured fish is mostly exported to foreign countries and only 40% of the cured fish produced in the State is consumed internally. The major economic species are pomfrets, ribbon fish, seer, cat fish, white bait, mullets, sardines, sharks and skates, silver bellies, prawns and flying fish.

(Dy. Secretary, Food & Agriculture Deptt., Govt. of Madras)

VIII. Seaweed Meal

Large quantities of palatable sea weeds are available on the Indian Coast. High mineral content of all mineral elements important to human and animal physiology makes sea weeds an unique supplement for a well balanced diet. Iodine in sea weeds from the angle of food is significant. Agarophytes have a high value but the phaeophyceas have the highest value. Japan continues to produce iodine from sea weeds. The other micronutrients besides iodine which are important in human metabolism are iron, copper, manganese and zinc and all of them are present among the trace elements of sea weeds. Iron content is relatively low in green sea weeds when compared with red and brown, the last containing the most. Manganese content is higher in Indian sea weeds than in the marine algae of temperate regions.

Marine algae are considered to be a good source of all the vitamins. Sea weeds are poor in crude protein and fat contents. That all the essential amino acids in human nutrition are present in sea weed proteins has been confirmed in Indian sea weeds, the ten amino acids (including tryptophane) essential for man and most animals having been screened by the methods of paper chromatography.

A cottage industry method of preparing the meal from *Gracilaria edulis* has been worked out at C.M.F.R.S., Mandapam, on the lines of the preparation of comminuted seaweed for agar extraction. Alternately, after cleaning the dry sea weed thoroughly in a stone mortar, using soft water, it is dried again and then milled in an industrial flour mill, the resulting meal being fine in texture, odourless, cream coloured and bland in taste.

(Central Marine Fisheries Research Station, Mandapam)

IX. Seaweed Manure

Coastal tracts could be made highly productive if seaweeds and sea-grasses were applied to them. Seaweeds are a storehouse of the important potash, ionic sulphate, trace elements and growth substances besides having every other element and radical required by plants. Seaweed manure seems to increase resistance to disease and holds water and air at the same time and improves the soil in both respects. When compared with 'green manure' in general, seaweed manure has a little less of nitrogen but a little more of phosphorus. Seaweeds would complement invaluable chemical fertilizers by adding trace elements and growth substances and would ensure all round enrichment of the soil.

Seaweeds considered as groups show that some red and brown algae have appreciable phosphate content, brown algae in general have high potash and both red as well as green algae are characterised by high sulphate content; calcium occurs in high percentage in almost all marine algae and trace ele-

ments are of general occurrence in them. In sea grasses phosphorus is higher than in the marine algae.

Field experiments with Mendi at C.M.F.R.S., Mandapam, indicated that yield per plant per season with *Hypnea* Compost was 73% more than in plants given cowdung and ash. The peak of fruiting was a month earlier in the *Hypnea* compost treated plots. At C.M.F.R.S., Mandapam, Brinjal, Tapioca, cyamopsis, Dolichos, gourds, Amaranthus, lime, papaya and drumstick gave good results when manured with sea weed compost. Crotons and zinnias also came out very well with seaweed treatment.

It was found that 2 months are needed for *Hypnea* compost to reach chemical stability, when composted in mounds 14 ft. in circumference and 4 ft. high. The partly sundried seedweed is placed in layers six inches thick with 1½ inches of dry powdered cowdung as inoculum placed between the layers of *Hypnea*. The whole mound is sealed with a 2 inch layer of clay and smeared with cowdung. The mound is watered carefully every day to maintain sufficient moisture within. At the end of 2 weeks there is a rise of 9° C within the mound and the temperature fall of 3° C after one month and another 5° C after 2 months. Then the manure is stable and ready for use. If composted in pits the seaweed should be prevented from rotting by keeping off the rain with a roof.

An association of brackish water Blue-green algae was cultured on the cold water soluble portions of seaweed composts and dry seaweeds. A good growth of algal association was obtained as shown by weight and by chlorophyll estimation and was compared with the growth resulting from treatment with certain other manures suitable for fertilising fish ponds.

(Central Marine Fisheries Research Station, Mandapam)

X. Fish Oil Production and Utilisation

STATE	Quantity of fish oil of different varieties		Utilisation	Scheme for development and anticipated production	Oil likely to be available for use as a raw material in manufacture of vanaspati
	Sardine oils	Shark liver oil	Skate liver oil		
I	2	3	4	5	
Bombay	..	5200 gallons per annum	..	No prospects for its increase in production as the fishery is erratic.	..
West Bengal	..	..	Shark liver oil is used as medicinal oil in human consumption everywhere. While the Sardine oil is used in Leather tanning and in painting of fishery boats. Whatever is produced is used in hospitals as medicinal oil.	No scheme for increasing the production.	No possibilities for its availability.
Madras	..	2500 lbs. per year	1000 lbs. per year	It is expected that the production of Shark liver oil will double in next five years.	No possibilities.
Orissa	..	Average is 5000 lbs. per year.	Do.	..	No oil is available for use in manufacture of vanaspati.
Kerala	54-55	165323 gal.	..	No scheme is there to produce fish body oil.	Sardine oil can be obtained in commercial scale.
	55-56	30288 "			
	56-57	insignificant.			
	57-58	643293 gal.			
	58-59	167796 "			

1	2	3	4	5
Government Oil Factory, Calicut	3105 tons in each session. (Received from State).	..	Proposed to be converted into fats and scaps.	..
Mysore	Sardine oil in South Kanara	Sharkliver oil	Same as above.	Nearly 75 tons of different varieties of oil are likely to be available during the next five years.
	54-55 51 tons	3½ tons		
	55-56 Nil	2½ tons		
	56-57 19 "	2½ tons		
	57-58 313 "	2½ tons		
	58-59 Nil	2 tons		
	In north Kanara			
	10,000 lbs. per annum	2000 lbs. per annum		

Inland

(i) Pisciculture in reclaimed swamps and its role in rural economy in Orissa

A considerable number of small and large swamps ranging between 4 and 1000 acres in Orissa are totally unproductive and contribute to insanitation and malaria. Owing to heavy reclamation costs and uncertain income, swamps had not been reclaimed either for agriculture or pisciculture. Experiments were conducted to reclaim a large number of swamps and to work out their economics. A new technique to reclaim deeply silted swamps at low cost had been evolved by subsoil pumping and a silt berm which raises itself by pressure from below. The bunds can be completed without the use of protective piles. Small swamps yield between 400 and 800 lbs. per acre while large swamps where stocking has to be done at random yield only 100 lbs. but they are economical, on account of low establishment costs. Details of expenditure on and income from a few swamps are given. Biological conditions and the effects of manuring of swamps have also been studied particularly with reference to growth of plankton and yields of fish and a few typical cases are described. It is concluded that the increase in production from swamps reclaimed according to the new technique would add considerably to the rural income and provide employment to a number of persons.

(Mitra, G. N. *Proc. I.P.F.C.* 1957)

(ii) Progress of Fisheries Development Schemes in Himachal Pradesh

During the First Five Year Plan, 200 mirror carp fingerlings were imported from Bowali hatcheries (U.P.) and stocked in pucca tanks, Nahan. Saro tank at Chamba was also developed for rearing and breeding of mirror carp.

During the Second Five Year Plan, an area of 125 acres would be brought under mirror carp culture and 1,25,000 mirror carp fingerlings are expected to be raised for stocking, out of which 54,000 have already been raised upto 1957-58. As a result of intensive stocking it is expected to produce 2,500 mds. of additional fish during 1959-60 and 1960-61.

Conservation of fisheries

The First Five Year Plan covered conservation of fisheries wealth in the rivers and streams in Himachal Pradesh over an area of 700-800 miles and provided employment to 1,200 fishermen per annum. Increased fish production was 5000 mds. valued at Rs. 2,00,000 per annum.

During the Second Five Year Plan conservation of fisheries wealth in the rivers and streams in Himachal Pradesh over an area of 700-800 miles providing employment to 1,300 fishermen per annum. Increased fish production was 6,000 mds. valued at Rs. 2,40,000 per annum.

Under-development of trout fisheries—A trout farm at Barot was developed to produce 45,000 trout ova per annum. During the Second Plan period trout farm at Barot was developed to produce 50,000 trout ova annually. Trout farm at Chirgaon was constructed to produce 50,000 ova annually.

Fish marketing scheme was started in the Second Plan but due to certain administrative difficulties it was dropped.

Under the training scheme one candidate was deputed for training at the C. I. F. R. S. Calcutta who completed the training successfully.

(iii) Report on the work done by Fisheries Extension Units during the period from April to Sept. 1959.

(1) ALLAHABAD

A survey was conducted in Kalpi, Orai, Harpalpur, Lalitapur and in-and-around Jhansi with a view to locating fish seed sources for stocking Mata

Tilla Reservoir. 46 tanks in different C. D. Blocks in the State were surveyed to determine their suitability for fish culture. The training programme of the Unit was continued and 335 candidates received training in fisheries development work in Blocks—Chail, Hathgaon, Bithora, Partapur, and Manima. 100 village level workers undergoing training at the Training-cum-Extension Project Jhansi and Kalakankar, were also giving instruction in fisheries work. Fishermen's villages—Seoni, Mehdouri, Kalakankar and Rajghat were surveyed to study their socio-economic conditions. Talks of fisheries development accompanied by fishery film shows were arranged at Karaon, Sirathu, Shankerghar, Jhusi, Chail and Bichpuri Blocks.

(2) BANGALORE

Seed collection survey work was continued at Kellodu near Hosdurga and in River Vedavathi. Tanks in Dharwar and Kalghtgi Blocks were surveyed for fisheries development work and necessary suggestions were given to the Block Development Officers regarding the improvement of the tanks. About 2 lakhs of spawn of *Cirrhina mrigala* and 500 spawn of *C. carpio* were obtained at Krishnarajasagar fish farm, as a result of induced breeding work. Minor tanks and community ponds in Malvalli and Ramnagaram Blocks were surveyed to assess their suitability for fish culture. Training in fisheries development work was given to 52 Gram Sewaks under training at Bagalkot. The socio-economic condition of the fishermen of Tungabhadra Dam was studied and necessary suggestions given for improvement. Fishery film shows were arranged at Basavangudi, Bangalore, Kudigi and Mandya National Extensions Service Block.

(3) BHOPAL

The survey of River Tons, in Teenthar Tehsil revealed considerable potentialities for the collection of fish seed. Stretches of River Narbada near Hoshangabad were surveyed for locating suitable Mahaseer fry collection centers. About 14.5 lacs of spawn and 10,000 fry and fingerlings were obtained during test collection during the survey. 47 trainees of Gram Sewak Training Centre, Obedullaganj were trained in fisheries development work. Meetings of the fishermen were organised in a number of villages, where talks on improved methods of pisci-culture were given. Fisheries Exhibitions were set up at Narsinghpur, Seoni, Panna, Saugor, Bhelsa, Chatarpur and other fishing villages and fisheries development activities were explained to the visitors. A short training course was conducted at Rewa for the junior staff of State Fisheries Deptt.

(4) CALCUTTA

Demonstration of induced breeding of major carps by pituitary hormone injections were arranged at Joysagar, Silchar, Nowgong, Gauhati and Tejpur and about 34 lacs of fish seed of major carps were produced by these demonstrations. *Catla*, the fastest growing major carp was induced to breed for the first time. Water areas at Memari and Beguan N. E. S. Blocks were inspected and programmes for development of fisheries in these areas were drawn up in consultation with B. D. Os concerned. A training course in fish breeding by pituitary hormone injections was conducted at Cuttack. Training in improved techniques of fish farming was given to the villagers of Narendrapur and Ramchandrapur, 24 Paraganas, as well as to students of Fisheries Deptt. Ramkrishna Mission, Narendrapur. Scientific techniques for the preparation of nursery tanks, checking mortality of fish seed and various other aspects of fish farming were explained to various State fishery officers, fish farmers and the trainees of C. I. F. R. S. Barrackpore. A large quantity of fish seed, more than 100 pieces of different kinds of fishing nets and 75 thans of net cloth were supplied to different States, through the Fish Seed Syndicate.

(5) GAUHATI

Approximately 3,30,000 fry and fingerlings of *L. rohita* were obtained from nurseries previously stocked with "Rohu" spawn produced by induced breeding, for distribution to private pisci-culturists, C. D. & N. E. S. Blocks and deficit parts of the State. A demonstration of improved methods of fish seed transport was arranged. Necessary technical advice was given for improving fish culture in the tanks of "Talukbari Food and Fish Corporation", the owners of the tanks in Barket Road NES Blocks. Three pamphlets were prepared for publicity purpose.

(6) HYDERABAD

A preliminary survey of all the districts of Telangana initiated earlier, for locating possible fish breeding grounds, was completed. A camp at Sardana village was established for observation and collection of fish seed. Survey of rivers Manjira and Ayeru was continued for locating suitable spawn collection centres. Large quantities of spawn, collected from three centres, thus located, were stocked in nurseries. The unit conducted successful experiments in induced breeding of major carps at Sunkesula fish farm and about 2 lacs of carp fry were produced in the nurseries. A refresher course was organised at Hussain Sagar Fish Farm, Hyderabad, during the first week of June. Talks on pisci-culture accompanied by fishery film shows, were arranged for Lok Sahayak Sewa Camp at Medchal and the trainers of Block Panchayat at Rajendra Nagar Training Centre. A.V. demonstrations were arranged for Lok Sahayak Sewa Camp at Medchal and the trainers of Eudige, Siva Samudram, Hospet and Tungabhadra Dam.

(7) KARNAL

Bibipur Lake near Murtazpur, low lying areas near Darrar River Jamuna near Shadra and Wazirabad and rivers Ghaggar and Sunam Cho in Patiala District were surveyed by the F.E.U., Karnal, for locating spawn collection centres. Low lying areas near Samana and Jarhari were surveyed and about 1000 carp fingerlings, caught from Samana, were stocked in Chana Fish Farm. After necessary survey of tanks, the owners of about 105 tanks in Karnal, Pundri, Gharaunda, Panipat, Nelokheri and Thansar Blocks were given technical instructions for improving pond and culturing fish in them. Training in fisheries development work was arranged for village level workers at Extension Education Institute, Nilokheri. Training and demonstrations of induced breeding of Major Carps were arranged for State Fisheries Officers.

(8) MANDAPAM

The survey of Vaigai River and Pullamadam Creek was continued. 16 private water areas near Mandapam were surveyed and necessary suggestions given for their improvement. Demonstrations of improved methods of fish curing were arranged at Ramnathapuram, Tirunelvely, Kanya Kumari Dist. Nambuthalai, Thondi, Muttam, Colochal, Rameshwaram, Tuticorin, Vedalai, Theedai etc. A demonstration of the utilisation of sea-weeds for the preparation of Agar was arranged at C.M.F.R.S., Mandapam. Lectures, discussions, film shows and exhibitions were organised at ten village Leaders' Training Camps and other places. Five information pamphlets were prepared and distributed in the State.

(9) PATNA

Rivers Durgavati and Karmanasha in Bhabhua sub-division and the northern tank of River Ganga were surveyed to locate spawn collection centres. An experimental spawn collection centre, on river Gandak at Khilwat Ghat was established to assess the availability of spawn. Demonstration of improved methods of spawn collection, were arranged for the local fishermen and Cooperative Societies. The Reservoir and Quarry pits, belong-

ing to the Associated Cement Co. at Jhinkpani were visited and necessary technical advice, for fish farming given. Instruction in fisheries work was given to village level worker trainees, students of Ranchi College and the trainees of Refresher Course. Socio-economic conditions of the local fishermen were studied and necessary suggestions given to improve them.

Technology

(i) Experimental Preservation of Fish in Aureomycin ice

The effect of employing ice containing 5 p.p.m. of aureomycin as compared with ice containing no aureomycin, on the trimethylamine and total volatile nitrogen content as well as the bacterial population of the muscle of fish kept in ice was examined in a series of experiments at the laboratory of Central Marine Fisheries Research Station, Mandapam. The increase in the capacity of the muscle to combine with iodine which has been recently suggested as a useful index of spoilage was also followed. These investigations were essentially exploratory and hence relate to different species of fish and different tests for freshness. The observations are reported and discussed in this paper.

The experimental studies indicated that during the first week of storage there appears to be no advantage with aureomycin ice but its beneficial effect becomes perceptible in the subsequent period of storage. The fish when properly iced can remain in good condition upto 7 or 8 days, without the aid of chemical or antibiotic preservatives. The bacterial count and the T.M.A. content of the fish muscle indicate the superiority of ice containing 5 p.p.m. of aureomycin over ordinary ice. The observation that there is a paucity of psychrophiles in fish preserved in aureomycin ice as compared with fish kept in ordinary ice is significant since spoilage in iced fish can be caused only by the psychrophilic bacteria. The experimental studies stress the necessity of icing the fish immediately upon landing.

(Velankar, N. K. and Kamasastri, P. V. *Indian Jour. Fisheries* Vol. V, No. 1—April, 58)

Trade

(1) EXPORT

Articles and countries to which exported	Twelve months ending Dec., 58	
	Quantity (Cwt.)	Value (Rs.)
<i>Fish fresh or simply preserved</i>		
<i>Fish fresh chilled or frozen</i>		
<i>Hilsa live or dead</i>		
Ceylon	9	1307
Nepal	*	16
	<hr/>	<hr/>
	9	1323
<i>Fresh fish live or dead—others</i>		
U.K.	15	7041
Germany W.	6	960
Aden	*	54
Bahrein Is.	68	9749
Kuwait	39	4947
Pakistan W.	*	583
Singapore	896	66621
Saudi Arab	72	13183
Nepal	7	755
U.S.A.	146	28962
	<hr/>	<hr/>
	1249	132855

*Articles and countries to which exported**Twelve months ending Dec., 58*

	Quantity (Cwt.)	Value (Rs.)
<i>Bangdas Wet Salted</i>		
Ceylon	18574	226709
	18574	226709
<i>Soormai Wet Salted</i>		
Ceylon	1741	75644
	1741	75644
<i>Other Fish Wet Salted</i>		
Kuwait	5	625
Ceylon	5910	59160
Singapore	98	7239
Nepal	*	67
	2013	67091
		503622*

Fish Salted Dried or Smoked but not further prepared.

<i>Bomlas Dry Unsalted</i>		
U.K.	136	39893
Germany W.	3	1007
Aden	6	518
Kuwait	4	853
Ceylon	96833	10147336
Singapore	702	60501
Malaya	102	21959
Saudi Arab	32	2558
Burma	6730	536472
Rhodesia S.	6	600
Kenya	64	4925
Tanganyika	19	1427
Nyasaland	2	235
Mauritius	5926	469999
Mozambique	28	1960
Reunion	8	650
U.S.A.	16	2670
Fuji Is.	11	1715
	110628	11295278

Fish Dried Unsalted

<i>Other Sorts</i>		
U.K.	4	1268
Ceylon	5536	517449
Singapore	664	55919
Malaya	144	32942
Burma	343	20581
Mauritius	20	1650
	6711	629809

*Articles and countries to which exported**Twelve months ending Dec., 58*

	Quantity (Cwt.)	Value (Rs.)
<i>Fish Dried Salted</i>		
Ceylon	301905	24760559
Singapore . . . . .	..	32
Malaya	6	1293
Hongkong	899	76231
Burma	160	12294
Kenya	49	4410
Fiji Is.	5	580
	303024	24855399
<i>Shark Fins Fishmaws</i>		
<i>Similar Fish Parts</i>		
U.K.	1658	598108
France	35	5447
Singapore	3062	958506
Honkong	405	230659
New Zealand	10	839
	5170	1793559
<i>Other Sorts</i>		
Singapore	134	6950
Burma	321	18561
U.S.A.	20	8404
	475	33915
		38607960*
<i>Crustacea and Molluscs fresh</i>		
<i>Chilled Frozen salted dried or simply cooked.</i>		
<i>Crustacea excl. prawn.</i>		
Germany W.	2	699
France	4	1371
Switzerland	1	3287
U.S.A.	1250	315104
	1257	320461
<i>Prawns</i>		
U.K.	37	7586
Germany W.	21	10430
France	14	4461
Switzerland	84	28502
Bahrein Is.	1	176
Ceylon	9178	957946
Singapore	1023	144551
Malaya	60	6850
Honkong	420	44150
Saudi Arab	8	1769
Afghanistan . . . . .	..	12
Burma	73743	12219809

*Articles and countries to which exported.**Twelve months ended December, 58*

	Quantity (Cw s).	Value (Rs.)
Nepal . . . . .	..	235
Rhodesia	6	926
Zanzibar	2	990
Tanganyika	3	993
Nyasaland	4	1279
Mauritius	511	103094
Mozambique	8	1265
Canada . . . . .	..	41
U.S.A.	14630	3544675
Cuba	135	44222
Australia	352	113674
Hawaii	58	23016
	100298	17260652
		17581113*
Total		56692695

Fish and fish preparations canned or not .

*Fish, fish products and fish preparations in air-tight
containers including crustacea and molluscs.
Crustacea and Mollusc Prepn canned.*

Sweden	27	15000
		15000

Fish canned excl sardines Pilchards

	27	
U.K.	81	47045
Finland	63	37101
Sewden	268	140751
Germany W.	35	20679
Netherlands	27	16065
Italy . . . . .	..	200
Greece	37	20692
Cyprus	5	3000
Aden	24	12281
Bahrein Is	20	9265
Hongkong	34	2912
Muscat	15	9965
Saudi Arab	7	4450
Iraq	21	11385
Kenya	13	6735
Nyasaland	12	6662
Mauritius	18	9909
Bel Congo	18	11938
Canada	479	271178
Leeward Is	4	2308
Barbados	2	1318
U.S.A.	892	305469
Venezuela	3	1252
New Zealand	5	3162
	2083	955722

*Articles and countries to which exported.**Twelve months ended December 58*

	Quantity (Cwts.)	Value Rs.
<i>Other sorts</i>		
Kuwait	2	215
Saudi Arab	4	540
U.S.A.	6	12
		767
		971489*

*Fish, fish products preparations not in airtight containers including crustacea.**Fish product preparation Nes not canned*

U.K.	33	7444
Cyprus	2	435
Bahrein Is	6	961
Kuwait	4	1080
Trcl Oman	9	1070
Singapore	16477	184284
Malaya	4405	65195
Saudi Arab	18	2815
Kenya	1	236
Nyasaland	4	551
Sudan	1	113
Australia	3	407
	20963	264591
		264591*
Total		1236080

*Meat Meal Including tankage and Fish meal**Fish Meal*

U.K.	318	175501
Germany	25	8550
Netherlands	145	55563
Ceylon	130	35350
	618	274964
		274964*

*Animal oils and fats**Oils from fish and marine animals**Others*

Aden	103	3750
Bahrein Is	803	28551
Kuwait	2454	77020
Trcl Oman	1832	56057
Maldives	34	1450
Muscat	192	6970
Saudi Arab	69	2772
Iraq	2165	61952
Iran	140	3950
	7792	242472
		242472*

*Articles and countries to which exported**Twelve months ending Dec., 58*

	Quantity (Cwts.)	Value (Rs.)
<i>Fertilizers crude, Natural Fertilizers of animal or vegetable origin not chemically treated.</i>		
<i>Fish Fertilizers</i>		
Kuwait	60	900
Singapore	1300	19022
Sarawak	1000	15000
	2360	34922
<i>Guano</i>		
U.K.	1960	48834
Germany W.	980	21600
Netherlands	4320	97189
	7260	167632

(2) IMPORT

*Articles and countries from which imported**Twelve months ending Dec., 58*

<i>Fish fresh or simply preserved</i>		
<i>Fish fresh chilled or frozen</i>		
<i>Hilsa live or dead</i>		
Pakistan E	45010	4560023
	45010	4560023
<i>Fresh fish live or dead—others</i>		
U.K.	68	9173
Germany W. . . . .	..	35
Pakistan E.	137270	14442960
Ceylon	1	711
Singapore . . . . .	..	717
Hongkong	2	1475
Thailand	1	50
	13734	14455121
<i>Bangdas Wet Salted</i>		
Pakistan E	111	9750
	111	9750
<i>Soormai Wet Salted</i>		
Muscat	166	8326
Saudi Arab	2715	144791
	2881	153117
<i>Other fish Wet Salted</i>		
Pakistan W.	17566	369503
Pakistan E.	4504	414300
	22070	783803
		19961814*
<i>Fish salted dried or smoked but not further prepared.</i>		
<i>Bomlas dry unsalted</i>		
Pakistan E	1774	132819
	18	2851
Hongkong	1792	135670

Articles and countries from which imported

Twelve months ending Dec., 58.

	Quantity (Cwts.)	Value (Rs.)
<i>Fish dried unsalted</i>		
<i>Other sorts</i>		
U.K. . . . .	..	502
Pakistan E	599	43293
Maldives	3	145
Hongkong	46	6436
Muscat	2459	49784
Saudi Arab	1308	30215
	4415	130375
<i>Fish cured</i>		
France	2	502
Pakistan E	1926	182326
	1928	182828
<i>Fish dried salted</i>		
Sweden . . . . .	..	20
France	3	490
Pakistan E	2	160
Maldives	59	4416
Hongkong	3	324
Japan	21	369
	88	5779
<i>Fish smoked</i>		
U.K.	8	2235
Denmark	5	1710
	13	3945
<i>Shark fins fishmaws</i>		
<i>Similar fish parts</i>		
Pakistan E	16	981
Hongkong	5	2700
	21	3681
<i>Other sorts</i>		
U.K.	16	2796
Pakistan E	83	6833
	99	9629
		471907*
		20433721
<i>Fish and fish preparations canned or not</i>		
<i>Fish, fish products and fish preparations in airtight containers including crustacea and molluscs.</i>		
<i>Fish canned excl</i>		
<i>Sardines Pilchards</i>		
U.K.	392	38633
Germany W	6	1311
Norway	260	37961

Articles and countries from which imported

Twelve months ending Dec., 58

	Quantity (Cwts.)	Value (Rs.)
Denmark	3	904
Netherlands	25	2013
Portugal	2	605
Hongkong	29	6040
Japan	7	1304
Canada	87	24242
U.S.A.	27	3749
	838	116762

Sardines and Pilchards canned.

Sweden	9	990
Norway	315	48713
Germany W . . . . .	..	9
Netherlands	20	1594
Portugal	18	2885
Japan	9	871
Canada	31	5140
	403	60202

Other sorts

U.K.	33	3555
Norway	83	9578
Denmark . . . . .	..	292
Germany W	1	401
Japan	5	528
	122	14354
		191318*

*Fish products and fish preparations not in air-tight containers including crustacea and molluscs.**Sauces fish crustacea and Molluscs*

Hongkong	10	738
	10	738

Fish product prepn. Nes not canned

U.K.	32	2917
Germany W	17	3041
Portugal	4	502
	53	6460
		7198*
Total		198516

Fish eggs for Breeding

	394	12685
Pakistan E	394	12685

Articles and countries from which imported

Twelve months ending Dec., 58

	Quantity (Cwts.)	Value (Rs.)
<i>Animal oils and fats, oils from fish and marine animals</i>		
<i>Cod liver oil in cont. upto 14 lbs.</i>		
Norway	40	2694
Singapore. . . . .	..	15
	40	2709
<i>Cod liver oil in other containers</i>		
U.K.	423	29014
	423	29014
<i>Sperm oil</i>		
U.K.	895	71054
Norway	169	13171
	1064	84225

MARINE FISHERIES RESEARCH

Progress of the Scientific work done at the Central Marine Fisheries Research Station, Mandapam, for the six months period ending September, 1959.

Fishery Survey.

The data collected in the various zones during the first and second quarters were analysed. The total landings of marine fish during the 1st and 2nd quarters of 1959 were estimated at 172,794 and 87,893 m. tons respectively as compared to 191,714 and 123,757 m. tons in 1958. The characteristic features of the fishery for the 1st quarter were the considerable decline in the landings of Oil Sardine and noticeable increase in the landings of mackerel. The occurrence of Oil Sardine in good quantities in the southern region of Bombay State during this quarter is interesting. The main features in the composition of total catch during the 2nd quarter are the increased landings of elasmobranchs and mackerel (*Rastrelliger canagurta*) and reduced landings of Cat fishes, Oil Sardine, *Anchoviella*, *Harpodon nehereus*, *Trichiurus*, *Lactarius* and non-penaeid prawns.

Fishery Biology.

Inshore Fisheries Investigations: Inshore fisheries investigations on the fishery and biology of Oil Sardine (*Sardinella longiceps*), and other Clupeoids (*Sardinella fimbriata*, *S. gibbosa* and *S. albella*) were continued at Karwar, Mangalore, Kozhikode, Cochin, Neendakara, Mandapam and Waltair with special reference to length frequency, size frequency in the catches, maturity and feeding, meristic and morphometric characters of scales, Otoliths etc. Studies on the mackerel *Rastrelliger canagurta* were continued at Karwar, Mangalore, Kozhikode, Neendakara, Vizhingam and Porto Novo. An interesting feature during the first quarter was the constant occurrence of shoals of young mackerel 110-130 m.m. in the coastal waters suggesting that mackerel spawning grounds might be in close proximity to the fishing centres near Karwar.

Studies on the fishery and biology of commercial species of prawns belonging to *Metapenaeus*, *Penaeus* and *Leander* with special reference to species composition of the catches, length and size frequency, sex-ratio, maturity and feeding etc. were continued at the research unit at Kandla and Mangalore and Sub-Stations at Kozhikode, Cochin, Bombay and Madras. At Bombay, the study was based on the catches from mechanised vessels from Bombay and Saurashtra waters. *Hippolytina ensirostris* formed a sizable component of the prawn fishery towards the close of September.

At Cochin, the recruitment studies of prawn fisheries were in progress and the experiments in paddy field prawn fishery were concluded. Studies on the prawn catches of Stake nets indicated that the catches in the stationary nets have a direct relationship to the intensity of water currents. The Stake net fishery for prawns at the Ennore estuary and Pulicat were also under study. Studies indicated that *P. indicus* was the most dominant species in both places.

Inshore fishery biological investigations on other important food fishes like Malabar Sole, Hali-beaks, Seer fish, Mulletts, Tunnies and spiny lobster were carried out at Calicut, Mandapam, Waltair and Cochin.

Studies on Tunnies (*Katsuwonus pelamis*) from Laccadive area indicated two spawning periods for the species. Further studies on spawning, duration of spawning and the number of eggs spawned each time, diameter etc. are in progress.

An underwater survey of pearl and chank bed of Tuticorin was conducted in collaboration with the Madras State Fisheries Department and the F.A.O. Underwater Expert. The survey indicated an area of 9.84 sq. Kilometers and a total population of about 9,84,00,000 oysters in the paar. The paars off Tiruchendur and Manapad did not show the presence of any live oysters.

Off-Shore Fisheries Investigations.

Off-Shore fisheries investigations included observations on the mechanised fishing at Bombay, Cochin, Tuticorin and Calcutta.

At Bombay, 5 mechanised vessels of Deep Sea Fishing Station made 135 voyages making a total catch of 67,687.324 Kg. of fish during the 2nd quarter. During the third quarter, fishing had been stopped due to extended monsoon.

Studies were continued on the biology and fishery of the trawl fishery including Dara (*Polydactylus indicus*), Ghol (*Pseudosciaena diacanthus*), Shande (*Polynemus heptadactylus*), Koth (*Sciaenoides brunneus*), Karkara (*Pomadourys hasta*) and Bombil (*Harpodon nehereus*). Analysis of data on raciatum based on eleven morphometric characters of Bombil indicated that there are at least three stocks of Bombay duck independent of each other supporting the fisheries off Jaffrabad, Versova and Janjira—Murud and Masulipatam.

At Cochin, the 5 vessels of the Off-Shore Fishing Station and 6 vessels of Indo-Norwegian Project landed a total of 422,723 Kg. of fish during March—May. During the second quarter, M.T. 'Ashok' and 'Pratap' continued bull-trawling while the other three vessels conducted shrimp trawl operations. Due to the heavy monsoon the exploratory fishing activities was practically suspended during the third quarter. During the past three seasons the exploratory surveys were mainly centred in depths ranging from 13 to 50 meters in areas 160 A, 108 and 111 off Cochin and Alleppey. The percentage of good quality fishes was higher in the southern area (111) than in the northern

areas. Shrimp trawl operations by the three smaller mechanised vessels during the 1958-59 fishing season showed that 108 area close to Cochin is a good fishing giving a high catch returns.

Studies on the biology and fishery of *Nemipterus japonicus*, a Percoid fish which occurs abundantly in the trawler catches were commenced during the third quarter.

At Tuticorin, four mechanised vessels landed a total of 6878 Kgs. during the third quarter.

The fishing trawlers of West Bengal government conducted only four voyages during the six months period of April to September.

Physiology and Marine Fish Farming.

Physiological studies at Mandapam continued on the metabolism of *Tilapia* acclimatised to fresh and sea waters and at different temperatures revealed that at the extreme ranges of temperature which are very close to the lethal points for this species held at an average temperature of 29°C, the metabolic rates did not show much difference between the sea water and the fresh water group and between 25° and 30°C, the sea water group showed a reduction in the metabolic rate.

The survey of the Creek at Pamban from where large number of *Chanos* fry are collected every year for stocking inland waters was continued. The growth of *Chanos* in the marine fish ponds is being studied in relation to the planktological and other conditions.

Marine Biology.

Planktological investigations were continued at Bombay, Karwar, Mangalore, Kozhikode, Mandapam and Madras. The work on basic organic production in the inshore waters and analysis of the data on the seasonal distribution of diatoms in the Gulf of Mannar and Palk Bay received special attention at Mandapam. Analysis of the data collected on the seasonal distribution of Chaetognaths in Palk Bay and Gulf of Mannar in relation to the hydrographical conditions was continued. Study on collections of Chaetognaths from the Laccadives sea was also started.

Oceanographical studies on the hydrological conditions of the inshore and off-shore waters off Bombay, Karwar, Mangalore, Kozhikode and Cochin were continued. At Bombay, work was in progress on the analytical aspects of determination of particulate phosphorus by a direct method. At Cochin, a preliminary analysis of the temperature data and water samples collected for the current monsoon period June to September showed certain interesting features. The research vessel 'Kalawa' made 3 long and 3 short cruises and 55 stations were worked for the collection of hydrographic and other data, covering deep water sections in Arabian sea beyond the shelf and in the neighbourhood of Laccadives and the entire shelf between Cochin and Calicut.

Algology.

Studies on the successions of marine algal colonisation on a fresh substratum in Palk Bay have been completed. The study of the Indian Agaro-phytes is in progress. An estimate of the resources of two species of agarophytes which are the dominant ones in India was made with reference to Pamban Islands.

(Central Marine Fisheries Research Station, Mandapam).

Fishery Biology

(i) Notes on eggs, larvae and juveniles of fishes from Indian Waters

The communication deals with sixteen larval specimens of the sail fish, *Istiophorus gladius* (Broussonet) ranging in length from 3.4 to 11.75 mm; the particulars of which have also been given. Some of the typical stages are described briefly and figured. The account is claimed to be the first record of larval sailfish from Indian Waters.

The taxonomy of the genus *Istiophorus* has been mentioned in brief.

(Jones S.—*Indian Journal of Fisheries* Vol. VI. No. 1 pp. 204–210).

(ii) Observation on the Trawl-Fisheries of the Bombay and Saurashtra waters, 1949-50 to 1954-55.

The paper presents detailed analyses of the result of the trawling operations in the Bombay and Saurashtra waters during the years, 1949-50 to 1954-55. Besides, the total landings and the catch rate data relating to the chief categories of fishes, their distribution in relation to depth and also their abundance in relation to the temperature, light and tide factors are discussed. The whole fishable regions in the Arabian Sea was divided into several rectangular areas and numbered. These areas were constituting the five main regions namely the Bombay region; the Cambay region; the Veraval region; the Porbandur region and the Dwarka region and the fishery productivity of each region assessed. Until the season of 1952-53, the vessels concentrated mostly in Bombay and Cambay regions but later on majority of the fishing was done in the Dwarka region which has been found to be one of the best fishing grounds of the Indian Coast.

A table showing the total fishing effort and catches has been given. It is seen that the landings in the earlier years were low as the Government cutters were the only vessels doing trawling but during later years the landings increased enormously partly due to the entry of other vessels and partly owing to the conversion of the Government cutters into bull-trawlers.

Table showing the catch of all fish in lbs., and catch rate trends of the chief categories of fish from the different regions are shown in detail. Landings from the Dwarka region were seen to be richest and best. This region has also proved best for *dara* and *koth* fisheries. *Wam* fishery has been the best in the Cambay and the Veraval regions. *Ghol* occurred in considerable but varying quantities in all the regions. *Karkara* has been seen to abound in the Porbandur and the Dwarka regions.

Tables showing the variations in catch per hour at various depth ranges in respect of the important fishes are also given. The study showed that the bulk of the yields was near about the 20 fathom line with the *dara* and the *koth* showing relatively greater abundance on the landward side of this line while the *ghol*, the *wam* and the *karkara* occur a little to the seaward side of this line.

A record of the abundance of the fish in relation to light and tide factors were also maintained which showed that the yields of day trawling were better than those of night trawling and also that the catches tend to be better during the neap tide periods than during the spring tides. The differences in trends with regard to the data of bull-trawlers and *Taiyo Maru* No. 17 have also been pointed out. It has been suggested that these were due to differences in the gear and speed of trawling.

An examination of the catch rate and the temperature data pertaining to different regions revealed that there were different, though graded, pattern of temperature distribution among the different regions and that, correlated with these were differences in trends of the fisheries also.

The catches of the various vessels have been compared and it has been found that the bull-trawling yielded more catches than otter-trawling and by doing more bull-trawling, *Ashok* and *Pratap* were able to catch as much as $2\frac{1}{2}$ times more fish than the *Taiyo Maru* No. 17 while fishing in the same grounds in the same season.

(R. Jayaraman, G. Seshappa, K. H. Mohamed and S. V. Bapat—Indian Journal of Fisheries, Vol. VI No. I. pp. 58–144).

(iii) Size-groups of Choodai taken by different nets and in different localities.

The paper gives an account of the types of boats and gear employed in the *choodai* fishery; the mesh size of the various nets, the approximate periods when they are used and the location of fishing grounds. The observation reported relate to the period 1952–55. The fishery, comprised mainly of two species, *Sardinella albella* and *S. gibbosa*, is confined mainly to Palk Bay from March to October and Gulf of Mannar from November to March. The year class entering the catches of the various nets are also indicated.

The modal sizes at which the 1952–55 year classes first entered the catches of the various nets have been figured. Modal lengths of fishes released by bags of shore-seines, retained inside the bags and caught in the wings are compared. A comparison is made of the major size-groups taken by torch and hand-net and those released by shore-seines. The paper also gives other factors besides mesh-selection that might influence size-composition of catches.

(K. V. Sekharan—Indian Journal of Fisheries Vol. No. 1, pp. 1–30).

(iv) Laboratory experiments on some factors affecting the survival of marine teleost larvae

The survival rate of larvae of *Blennius pholis* and *Centronotus gunnellus* have been studied in the laboratory, under different experimental conditions. Survival of larvae in jars containing *chlamydomonas* and *Isochrysis* was slightly better than in jars without any food. The flagellates, however, seemed of very little food value, prolonging life only for two or three days. Larvae fed on flagellates together with *Artemia naupli* survived no better than larvae fed on naupli alone.

Larvae under alternate periods of light and darkness became more active, grew more quickly and survived longer than those kept under continuous illumination. The moderate agitation of the water caused by an unconfined stream of air bubbles was shown to have a beneficial effect on growth and survival and was found to be preferable to the use of plungers.

When kept at constant low or high temperatures, larvae of *C. gunnellus* (a arcticboreal species) withstood 0°C–10°C but soon died at 15° and 20°C. Larvae of *B. pholis* (a Mediterranean–boreal species) were killed at 0° to 15°C, survived at higher temperatures of up to 25° but soon died at 30°C.

Some larvae of *B. pholis* died of gas disease, their swim bladders being greatly distended. No cases of gas disease were seen in *C. gunnellus*, a species which lacks a swim bladder.

[S. Z. Qasim, Department of Zoology, Aligarh Muslim University.

J. Mar. Biol 1959 I(i)].

Hydrobiology

Plankton Calendars of the in-shore water at Mandapam, with a note on the productivity of the area.

A general plankton calendar for the Mandapam region based on the data collected continuously for over five years at two inshore stations off Mandapam as well as those from other stations operated at random in the area under investigation are presented in the paper. Separate calendars were prepared for the Gulf of Mannar and Palk Bay because of the observed differences in the characteristics of plankton of the two regions. These calendars are concerned mostly with the large variations which, after all, are the most important ones biologically and particularly in relation to fisheries.

The productivity of the inshore waters of the Gulf of Mannar and Palk Bay off Mandapam has also been briefly discussed.

(Raghu Prasad, R. Indian Journal of Fisheries, Vol. V, No. 1, April, 1958).

Fishing Craft and Gear

Experiments on Fishing Net Preservation

The communication deals with various net preservatives and the method of preservation, applied to different types of fishing gears to study how far the nets become strengthened by their application. The results have been compared with those preservatives used in other parts of the world. The experiments were done in series.

SERIES I

A study of the six preservatives subjected to continuous immersion in backwaters was made. Garnol and Kerosene in 1 : 6, 1 : 4, 1 : 2, coal tar and Kerosene 3 : 1, Garnol and Coal Tar, Mexphalte 20/30 and shell mineral turpentine, Myrobalan nuts (*Terminalia*), Panichikka (fruit of *Diospyros embryopetris*), bark of 'Kalasam' (*Odina wodier*) and bark of 'Kalasam' and Coal Tar were used and tested for breaking strength in wet condition after every seven days. From the results it was concluded that myrobalan nuts and mexphalte were ineffective; garnol, bark of 'Kalasam' and 'Panichikka' showed not very effective results, while coal tar, garnol plus coal tar and bark of 'Kalasam' plus coal tar were found to be effective especially bark of 'Kalasam' plus coal tar which seemed to show excellent effect.

SERIES II

Garnol, four kinds of cuprinols B.C. green cuprinol, brown cuprinol standard green cuprinol and cumilate 61/1 FNT and garnol plus kerosene, myrobalan nut plus coal tar, 'Panichikka' plus coal tar, bark of 'Kalasam' plus coal tar were experimented. The twines treated with 'Panichikka' and coal tar did not lose their original breaking strength and stiffness even after about 50 days. Bark of 'Kalasam' plus garnol and myrobalan nuts plus coal tar ranked next in effectiveness. These preservatives were considered best of all tested so far.

SERIES III

Marstein, net life green, cumimene 2 : 3 kerosene, mobilkote, wood tar, tablet cutch, English cutch, tamarind seed skin, cutch plus coal tar and bark of 'Kalasam' plus coal tar were experimented.

English cutch, plus coal tar and bark of 'Kalasam' plus coal tar both showed excellent results, but all the other preservatives were not very effective.

SERIES IV

Tablet cutch, tablet cutch fixed with copper sulphate and standard brown tectal cordage preservatives were experimented with in this series. The interval between two consecutive tests was reduced to 2-3 days and it was found that cutch and cutch fixed with copper sulphate both have effective period of preservation for 3-4 days whereas standard brown tectal had 4-5 days. As cutch dissolves in water hence it has been considered to be not very effective.

(H. Miyamoto and A. T. Shariff—Indian Journal of Fisheries.
Vol. VI No. 1, pp. 145–176).

INLAND FISHERIES RESEARCH

Progress of the scientific work done at the Central Inland Fisheries Research Station, Barrackpore, for the six monthly period ending September, 1959.

The various investigations on inland fishery problems in the Pond Culture, Riverine and Lacustrine and Estuarine Sections as well as other divisions of the Station recorded further progress.

The Research Station was shifted from Calcutta to its permanent headquarters at Barrackpore with effect from 1st June, 1959.

Pond Culture Division

Investigations on induced breeding of Indian Carps was continued and all the major carps were induced to breed by pituitary hormone injections and over 27 lakhs of fry and 7 lakhs of fry were produced by this method at Cuttack and Assam respectively. Non-specificity of glands in induced spawning was again demonstrated.

Field experiments on the common carp *Cyprinus carpio* at Cuttack indicated that in comparatively large water areas, the fish grows upto 10 lbs. in an year.

Mirror carp was successfully induced to breed in cement cistern at Cuttack following the same method as adopted for Bangkok stock of common carp. This is the first instance of Mirror carp spawning in the plains in India.

A small consignment of Chinese Silver carps was obtained from Japan for experimental purposes.

Field experiments on the productivity of Tilapia under normal cultivation conditions and under monosex culture indicated that by monosex culture, very satisfactory growth of fish attaining a weight of 12 to 14 oz. can be obtained.

A survey of paddy fields in different regions of Orissa was completed and study of physico-chemical conditions of water in selected paddy fields was continued. A fresh experiment on fish culture in paddy fields has been taken up at the Central Rice Research Institute, Cuttack.

Observation on soil composition in relation to fish production continued in selected tanks in Madhya Pradesh and Orissa revealed that under slightly acidic or alkaline conditions of soil, available soil phosphorus had an important role in determining the productivity of fish ponds, whereas available soil nitrogen had no correlation with fish production. Studies on the role of phosphatic fertilizers with trace elements indicated that in tanks treated with super-phosphate and trace elements, the organic productivity was high. Detailed chemical analysis of soil and water of poorly productive irrigation reservoirs in Madhya Pradesh was carried out.

Weed control investigation included sample survey of weed infested waters in Ganjam, Puri and Cuttack districts in Orissa and study of water conditions of weed infested waters. A preliminary investigation on the problem of high turbidity in Chandigarh lake (Punjab) was taken up.

Riverine and Lacustrine Division

At the Riverine and Lacustrine Division, investigations on catch statistics and disposition of fisheries in the Ganga, Narbada and Godavari river systems were continued at the various assembly centres. Biological investigations on the commercial landings of carps and cat fishes from Ganga and Jamuna with special reference to maturity and sex ratio, fecundity and breeding, food and feeding, age and growth were continued.

Water pollution studies on the effects of textile and tanning wastes on the fisheries of the river Ganga near Kanpur were completed and studies on the effects of sugar and distillery wastes were initiated in the river Daha in North Bihar.

Investigation on carp seed resources and location of spawn collection centres in the Tilaiya and the Konar reservoirs of D.V.C. indicated that major carp introduced earlier had spawned but the larvae did not seem to survive.

Narbada, Tapti survey was continued and a stretch of 250 miles was surveyed covering 300 villages on both banks of Narbada. New sources of carp seed were examined in Narbada in Broach district in Maharashtra State.

Spawn collection work was also initiated in Godavari and Rajahmundry appeared to be a good seed collection centre.

Lacustrine investigations at Tungabhadra dam was continued with special reference to the biology of the reservoir fishes, fishing tackle in operation and fish catches from the reservoir, and hydrological condition of the reservoir. Four ponds have been taken up for the study of growth and survival of fish fry.

Estuarine Division

The second phase of the major programme of investigations on the fisheries of the Hooghly, Matlah and Mahanadi estuaries was started from April, 1959. Intensive studies of the population dynamics and fluctuations in abundance and detailed studies on 26 species of fishes and 5 species of prawns which form atleast 1% of the total catches of the estuaries are now being conducted. Collection of catch statistics by sampling survey and total enumeration, analysis of commercial catches and hydrobiological observations of Hooghly and Matlah were continued. The sampling survey data collected so far from Mahanadi estuary have been compiled.

Investigations on the culture of brackish water fishes in the estuarine fish ponds in Orissa was initiated. The observational studies on the productive potential of selected brackish water bheris in West Bengal was concluded.

Investigations on the Hilsa fisheries and analysis of data collected on the meristic and non-meristic characters of Hilsa indicate that the stocks of all the major river systems sustain independent populations. The comparative study of fat contents of Hilsa from different localities to determine the possibilities of distinguishing the various stocks indicate a certain definite pattern of fat variation in the Hilsa stock in the various river system. Observations indicate the possibility of fairly good winter Hilsa fisheries in the lower Sundarbans for smaller Hilsa and abundant catches of migrating adults in the river during the monsoon season of 1960.

A census of fishermen and their tackle was undertaken at Collair lake and data have been collected for biological studies on the fishes of the lake.

Chilka Lake Investigations

Chilka lake investigations were continued on commercial fisheries of the lake, craft and gear employed, biological aspects of commercial fisheries and physico-chemical features of the lake. Catch-per-unit of effort studies were continued with particular reference to mesh size of the various types of nets.

Fish Pathology Investigations

Further studies on the problem of fish mortality in jute-retting tanks and cases of fish mortality in other tanks and ponds were undertaken.

A preliminary survey of Ligula infection in Tilaya Reservoir (D.V.C.) and surrounding areas was made.

Six scientific papers were published during the period

(Central Inland Fisheries Research Station, Barrackpore.)

Fishery Biology

(i) Observations on the culture of brackish water fishes in paddy fields in West Bengal

The culture of brackish water fish in rice fields is widely spread in West Bengal. The fields are constructed along embankments and are provided with well-built drainage canals. Tide water enters the canals, carrying several species of estuarine fishes. After the early rains, the bunds are cut to allow the merging of the canal water and that in the paddy field, and the fish then obtain access to an increased water area. During October and November, the water level in the fields decreases and the fish return to the canal whereupon fishing operations commence. About the time of harvesting the paddy the canals are bunded off into small areas and seine nets remove the last of the fish harvest. During the rainy season, the water in the paddy fields has a salinity less than 0.5‰. The dominant algae and phytoplankton genera are listed as also are the important species of fish and prawns cultivated. Notes on feeding habits of these species of fish are included and a table showing the growth of several species during September–November is given.

Production is estimated at 100–200 kg. per hectare. It is suggested that improvement in stocking practice including the transplantation of fry from other sources could increase production appreciably.

(Pillay, T.V.R. and Bose, B., Proc. I.P.F.C. 1957)

(ii) Observations on the occurrence, collection, acclimatisation, transport and survival of mullet seed in West Bengal

Fry of several species of gray mullets are available in coastal and estuarine areas in Bengal. Mullet culture is an important industry in embanked brackish water areas and develops during the period of reclamation of the land for rice cultivation. Stocking is either by the natural influx of fry where the embanked areas are flooded at high tide or by the planting of fry collection in small nets in inundated areas. In the Hooghly River, the best catches of fry occur during the spring ebb tides and appear to be associated with lunar phases.

The season of great occurrence of the fry are listed and a key to a detailed description of the fry of *M. corsula*, *M. tade*, *M. parsia*, *M. cephalus* are

given. The adaptability of mullet fry to differing salinities is discussed and experiments in the transfer of fry from salt to fresh water are described. It is concluded that such acclimatisation is a simple problem and does not require a long conditioning period. Comments on temperature, tolerance artificial feeding and methods of transportation are included.

(Sarojini, K. K. Proc. I.P.F.C. 1957)

(iii) Comparative effect of vitamin B₁₂ Cobalt nitrate and Ruminant Stomach extract on the survival rate of Indian carp during the first three weeks of life.

The paper deals with the result of experiment designed to explore the effectiveness of several possible sources of vitamin B₁₂ with one day old Indian Carp (*Catla catla*, *Labeo rohita* and *Cirrhina mrigala*).

Statistical analysis of the results with the carps allocated to five treatments for 19 days of crystalline vitamin B₁₂·25 and 50 µg. cobalt nitrate alone, cobalt nitrate with extracts of goat's stomach and an untreated control, revealed that the 50 µg. vitamin B₁₂ and the combination of cobalt nitrate with the extract of goat's stomach were better than the control at the 5 per cent level of confidence. The costs of the two significant treatments showed that with 50 µg B₁₂ the relative advantage lies with the combination of cobalt nitrate with the extract of goat's stomach as it costs Rs. 0.06 against Rs. 34.00.

Examination of the daily survival rates indicated that effectiveness of the experimental treatments was highest during the period of low survival, i.e., high mortality.

(Das, B.C.—Indian Journal of Fisheries—Vol. VI No. 1 pp. 211–221)

Hydrobiology

(i) A quantitative study of the Plankton and the physico-chemical conditions of the river Jamuna at Allahabad in 1954-55

The paper communicates the results of the observations made during the years 1954-55 in the river Jamuna at Allahabad to study the abundance, seasonal fluctuations and diurnal variation of plankton in relation to physico-chemical conditions of water.

The data recorded that water temperature varied as much as 12.0°C, turbidity reached its maximum value in September, pH remained more or less constant, dissolved oxygen maximum in February and minimum in September; high total alkalinity values between December and July, carbonate ion was present through the year excepting August and September, high chloride values from May to July, and high nitrate, phosphate and silicate values from January to August, September and October, June respectively.

The phytoplankton and zooplankton forms encountered have been listed and monthly fluctuations depicted. It was observed that phytoplankton 619 units and zooplankton 189 units per litre were highest in June and lowest 19 and 9 units per litre respectively in October. The data proved that physico-chemical conditions had a great bearing upon plankton productivity of the river. June conditions favour the growth of plankton. Low temperature observed in January retarded plankton production. Turbidity, current and influx of rain water from floods had detrimental effect on plankton. Alkalinity and phosphate had inverse relation with phytoplankton.

The ratio of zooplankton to phytoplankton was found to be 1:3. Diatoms were dominant amongst the phytoplankton and Rotifers amongst the zooplankton. Diurnal variation has also been observed. Direct relationship between lunar illumination and plankton was also seen.

(R. D. Chakrabarty, P. Roy and S. B. Singh—Indian Journal of Fisheries—Vol. VI No. 1 pp. 186–203)

FOREIGN

GENERAL AND DEVELOPMENT

Marine

(i) Jet propelled fishboat may revolutionise design

The world's first jet propelled, forward drive fishboat is making commercial fishing history in Alaskan waters. The boat is propelled with twin hydrojets and powered by two 160 horse power turbocharged diesels and reach a speed of 10 knots. It is of all steel construction—copper bearing steel and has a double bottom which serves as a storage tank for 1000 gallons of fuel and 500 gallons of water to service other fishing craft. This unique craft 40' by 14' is pushed through the sea by two jets of waters shot from nozzles under the hull. It offers three major advantages which may revolutionize the design and construction of commercial fishing vessels:—

(1) It can work over and around nets without danger of fouling propellers or ripping nets—a double hazard which has cost the industry dearly in the past.

(2) Drawing only 14" of water, it can work with complete freedom over shoals and tide flats which cannot be reached in conventional craft. In water deep enough for other boats, this is insurance against damage to propellers, and shafts from unseen floatsam, as well as shoals, stumps, rocks and other bottom obstructions.

(3) There is no problem with moving drive shafts, so that twine-engine drive unit can be located all the way forward—directly below the wheel house; thus leaving the rest of the boat for a large hold completely free for fish. The jet vessel operates from a mothership, which is a complete floating cannery, gathering fish from gillnetters.

(Fisheries Newsletter, December, 1958 page 23.)

Inland.

(i) Salmon Fish Farming Shows Promise.

Optimistic report on fish farming with Salmon has been received from Washington. Nearly 4 million Salmon have been reared and released under the programme. Till January 1958, the programme has cost \$ 24,870 for land construction, feed and the eradication of predators.

The Salmon are taken directly from fresh water pools at the hatcheries and placed in ponds, sometimes directly into salt water. The mortality rate is low. They are held in the natural basins until they reach the stage of growth where they would begin to migrate and then they are released. In some of the basins two crops can be raised in one year. Seven lakes and lagoons have been planted with salmon or are ready to be planted. Thirty five additional sites are under investigation.

The salt water rearing programme is expected to be accelerated following the acquisition of some additional lagoons under survey. Additional possible salmon rearing areas are expected to be found. Approximately 65 million fish are expected to be released under the programme.

(Commercial Fisheries Review Vol. 20, No. 10, October, 1958, p. 40-41).

(ii) **Southeastern Lake system rehabilitated for use in Salmon rearing**

Six lakes were chemically treated by the Alaska Department of Fish and Game in the Petersburg-wrangell and ketchikan areas to remove all resident fish, these lakes three in ideal cove and three in the cove system in George Inlet, will be planted with Salmon when clear of the chemical (toxaphene). These experiments will test the capabilities of the lakes for rearing Salmon with the competing and predaceous fish removed. The department inaugurated this series of applied research to determine the feasibility of using toxaphene as a tool in Salmon management.

The previous experiment performed using rotenone, were successful. Toxaphene has the advantage over rotenone of costing about one fiftieth as much to treat the same amount of water.

(Commercial Fisheries Review October, 1958, p. 13).

(iii) **New type fish screen proves successful**

The Tracy fish screen, which is located at the Tracy pumping plant on the Delta Mendota canal in central California and is designed to keep very small finerling fish from the destructive maws of the giant pumps, is reported to be operating efficiently.

The screen was designed and built by the U.S. Bureau of Reclamation after four years of research.

The screen utilizes the biological fact that fish fry float down stream tail first, instinctively avoiding obstruction in their paths. Designed like a giant venetian blind with vertical louvers, the screen is placed at a 15° angle to the flow of the water. Each individual louver is placed with its broad side 90° to the water flow.

The tiny fish, warned by the water turbulence set up by the louvers, are able to swim against the slow moving current while maintaining their downstream progress until they float into a bypass channel which takes them past the dangerous pumps. It is reported that 3,437,000 fish have been rescued within two months.

(Commercial Fisheries Reviews Vol. 20 No. 10 October, 1958 p. 19-20).

Technology

(i) *Freezing and Transport cases of Reinforced Plastics:*

A new type of freezing and transport cases manufactured from reinforced plastics has been introduced in Norway. Graded bottom makes a rational stacking possible both vertically and diagonally. Plastics do not stick to ice and the cases are therefore very serviceable for block freezing. The contents of the cases may be emptied in one single operation into cheaper packaging if it is necessary. The cases are guaranteed at temperatures ranging from -45°C to $+200^{\circ}\text{C}$ and are resistant to most acids and bases, they do not become sour nor corrode. The manufacturing is carried out by means of the hydraulic heat pressing method whereby the material is exposed to high pressure and great heat, resulting in conformity of the material.

Norwegian Fishing News, Vol. VI, No. 3, 1959).

(ii) *Anti-Corrosion Primer.*

A very effective anti-corrosion paint, Blycyanamid DK 825, based on the results of 18 years of scientific research has been produced in Norway. It retains its alkalinity being free from oxygen and therefore prevents the formation of rust. Tests were conducted and they proved that Blycyanamid remained unaffected for 16 years in Chlorine Factory compared with Red Lead which corroded in less than 6 years. It can be stored for years without forming a precipitate. It is being exported to several countries.

(Norweign Fishing News Vol. VI, No. 3, 1959).

(iii) *Russian methods for freezing fish at Sea.*

The development of efficient fish freezing at sea and the construction of appropriate installations to effect this are the two most important problems facing the fishing industry. These problems have been studied in Russia since 1888 and today about 300 large refrigerated fishing vessels are in operation. These are installed with (1) freezing in brine and (2) freezing with air blast. In the former case, sometimes fish are dipped in cold brine and sometimes it is sprayed over the fish. Various types of conveyors are used for carrying fish through the brine spray. Other vessels are equipped with tunnel freezers of the parallel air blast type.

Abroad the trawlers, after unloading on the upper deck, the fish is delivered through a bunker on to a table where 6 men are working. Each gut seven fish per minute by hand. The gutted fish are placed on one of the two conveyors, one leading to the fillet production line, and other for freezing drawn cod in blocks. Machines are used on the filleting line for heading, filleting and skinning. The fillets are washed in brine, packed in pans, the pans are loaded into trucks and run into the freezing tunnel. Eventually the fillets are taken from the pans and glazed with a water spray. The blocks are then cartoned, weighed and marked and stacked in the hold.

There were many drawbacks and a new method was evolved by scientific research institute for refrigeration, whereby these faults were eliminated. Research is still proceeding in the Soviet Union on methods of freezing by heat transfer; by direct contact of fish with cooling surfaces etc.

(Commercial Fisheries Review Vol. 20 No. 12 December, 1958, p. 81).

(iv) *Cooling Fish Fillets*

The fishing industry has false ideas about the cooling ability of crushed ice, also too many believe that a little ice will do a lot. The general idea seems to be that once a fish, a can or a plastic bag of fillets has been surrounded, even tightly, with crushed ice, irrespective of the thickness of the fish itself or the container of fillets that rapid chilling and no further spillage is assured. If the lot of fillets happens to be thick and their temperature warm, it may take hours for the temperature to drop to where bacterial activity is effectively slowed down. Meantime, spoilage is taking place at rapid rate. The answer to this situation is to ice heavily and use thin lots of fillets.

The effectiveness of icing is shown in the report. The packages of fillets were cooled with plenty of ice on both top and bottom, a 3 inch layer starting at 40°F cooled to 38°F in 2½ hours; a 6 inch layer took 10 hours. A 3 inch layer starting at 60°F cooled to 33°F in 4 hours; while a 6 inch layer was cooled from 60° to 36°F in 10 hours and several more hours would be needed to reach 33°F. Thus the thickness of the layer is of very great importance.

(Commercial Fisheries Review Vol. 20 No. 12 December, 1958—p. 8).

(v) *Small fish meal plant developed.*

An engineering firm of Hull, England, has developed an interesting range of small fish meal plants, which are sufficiently compact to be installed aboard ship or in other confined spaces and are also claimed to be entirely self contained

The plants are designed for the production of meal and oil from fish and fish offal, shell fish abattoir and industrial waste products. It has a 60 h.p. gas turbine whose exhaust gases provide heat for cooking and drying. A standard unit is claimed to be suitable for all types of gutted and ungutted fish and has fish or fish waste capacity of up to 2,000 lbs. an hour and 1,500 lbs. an hour for shell fish or shell fish waste.

The raw fish or waste is fed to the scraper elevator which discharges to the hogger, a machine specially designed for the reduction of fish, offal and similar materials. From the hogger, the reduced material falls into a twin screw metering which feeds the cooker with a steady continuous flow of raw material at a predetermined rate.

The cooker is a horizontal tubular vessel fitted with a jacket through which a proportion of the hot gases from the gas turbine are circulated. A special form of screw conveys the material through the cooker.

The cooked fish or offal is then lightly pressed in the new design, screw conveyor press, which removes a proportion of the free liquors. The press discharges through a magnetic separator to a combined dryers and grinder where the turbine exhaust gases are introduced to provide latent heat.

The dried meal is drawn through a cyclone separator and cooled in a further cyclone system which incorporates an adjustable cooling air intake and rotary valve discharge.

(Commercial Fisheries Review Vol. 20 No. 12, December, 1958, p. 83).

MARINE FISHERIES RESEARCH

Fishery Biology

(1) *Yellow fin and Skipjack Tuna tagged along Baja California coast.*

A total of 1,399 Yellow fin and Skipjack Tuna were tagged by biologists of the California Department of Fish and Game aboard fishing vessel 'Cape Beverly' to study growth migration and to collect and identify marine organisms associated with the Tuna fishery etc. Six tagged Yellow fin and seven Skipjack had been captured and returned to department before the return of the tagging team.

Marine organisms were collected at 21 different stations. Sea surface temperatures were taken at bait and fishing stations. The most successful catches of Tuna were obtained in temperatures ranging from 72.1 to 78.6°F.

(Commercial Fisheries Review Vol. 20 No. 12, December, 1958, pages 31-32).

(ii) *Salmon Research in North Pacific*

Two fishing vessels chartered by the Fisheries Research Board of Canada, have begun Canada's third Pacific Ocean survey. Both boats were fitted out at the Board's biological station at Nanaimo and will be cruising the high seas throughout the summer. While at sea the vessels will fish for Salmon and other species to build up knowledge already gained on the racial characteristics and migratory patterns of Salmon. Nine test fishing stations have

been plotted and fishing operations will follow closely along lines established in 1956 and 1957.

The Canadian vessels will be responsible for the areas of the Pacific Ocean north of latitude 155 degrees. American and Japanese research teams will cover other parts of the North Pacific.

The vessels are carrying drift nets with mesh sizes varying up to a maximum of nine inches. Other drift nets will be set to fish at depths varying from the surface to 200 feet under water. In addition both vessels will use midwater trawls when conditions warrant.

Fish will be kept in refrigerated storage holds. At the conclusion of operations specimen will be examined for fish scale markings, parasites, stomach-contents feeding habits and other factors that may have some bearing on the past history of the fish. Information and specimens will be pooled with the other countries concerned. Some tagging will be carried out when conditions are favourable.

(Commercial Fisheries Review Vol. 20 No. 9, September, 1958, p. 81).

(iii) *Tag Returns Reveal Migration of Albacore in Pacific*

Two more Albacore Tuna, tagged by the California Department of Fish and Game in 1956-57 have spanned the vast Pacific to shed new lights on a life history once thought impossible to record. These fish travelled several thousand nautical miles to participate on the ocean fishery of two great continents. Fish tagged near the California coast were caught off Japan.

For many years it was believed that the Albacore resources in the North Pacific was made up of three main populations—one that lived along the west coast of Baja California and the United States, another near the Hawaiian Islands, and a third off the coast of Japan. Conclusive proof of this theory was difficult to obtain. Californian biologists tagged them in 1952 and early returns revealed secrets when a Japanese fisherman captured one of the tagged ones near Japan in 1953. This history making occasion did not constitute positive proof that there was free mixing between the California and Japanese population.

In 1954 two additional tagged ones were recaptured near the Hawaiian Islands demonstrating an even more closely knit relationship. Subsequent tagging has shed further light on these inter relationship.

(Commercial Fisheries Review Vol. 20, No. 10, October, 1958, p. 37).

Hydrobiology

(i) *Primary production in Tropical Marine Areas.*

An outline of the primary production in tropical waters is presented. It is shown that the replenishment of the nutrient salts ordinarily governs the size of the production both in the open sea and in coastal waters. Whereas in the open sea this replenishment is provided primarily by water circulation, in shallow coastal waters it is provided by decomposition taking place primarily in the upper layers of the bottom sediments. Because the decomposition is due to microbiological processes it is dependent on temperature. The water circulation in the open sea, on the other hand is not dependent on temperature. Hence this factor is of quite different importance in the two habitats.

(E. Seemann Nielsen, Copenhagen J. Mar. Biol. Assoc. India, 1959).

INLAND FISHERIES RESEARCH

(i) *On the use of Marigold (Tithonia diversifolia Gray) as green manure in Indonesian Carp Ponds.*

A series of experiments with *Tithonia diversifolia* Gray was carried out in order to increase the yield of *Cyprinus carpio* L. It was concluded from investigations concerning yield, the biota of the ponds and the gut contents of the fish, that maximal increase in yield is obtained by manuring in the inflowing water, in ponds stocked with fry of the common carp together with large male *Tilapia*. An explanation was sought in the direct influence of the large development of Oligochaetae among the decomposing vegetable matter and in the indirect effect of liberation of minerals caused by the decomposition. Algae, such as *Spirogyra* encouraged by the organic manure not digested by zooplankton and of limited nutritional value for the carp were eaten by the *Tilapia*.

The maximal increase in yield was obtained by manuring with 6.8 ton *Tithonia* per hectre per month at a stocking rate of 50,000 carp of 1.3 gram and 6,800 *Tilapia* of 3.6 gram. The increase in yield, caused by *Tithonia* amounted to 85 kg. carp and 39 kg. *Tilapia* per hectare per month.

(a. Vass—Van Oven. Proc I.P.F.C. 1957)

Fishing Gear and Craft

(i) *Wrapping and Dipping Tests*

Canadian research has shown that air tight wrapping does not retard the spoilage of unfrozen fish fillets. Wrapped fresh fillets, however, not coming in contact with retailers' hands, are more acceptable to the consumer. Air tight wrapping retards the start of spoilage in frozen fish fillets. The spoilage rate was measured, apart from appearance and of odours, by comparing T.M.A. values.

Tests with wrapped, fresh, untreated fish fillets kept at 32°F showed that they had a shelf life of up to five days in a very good state of preservation. Wrapped, fresh fillets, dipped for 15 seconds in "acronize" (the solution containing 10 ppm. chlortetra cycline) and held at 32°F showed no off odours for 9 to 10 days. Tests with unwrapped fresh, untreated fillets on ice showed them to have a shelf life of up to 10 days, while treated unwrapped fillets kept for about double that time in good condition.

(Fisheries Newsletter October 1958, page 33).

GENERAL FISHERIES NEWS

(i) *Central Inland Fisheries Research Station, Barrackpore*

The Central Inland Fisheries Research Station was shifted from Calcutta to its permanent buildings at Barrackpore. The buildings were declared open at a formal function by Dr. B. C. Roy, Chief Minister, Government of West Bengal on 17th June, 1959 at which Shri M. V. Krishnappa, Deputy Minister, in-charge of Fisheries, Government of India presided. The campus of the Research Station has an area of about 13 acres of land in which the main laboratory buildings and a hostel building for accommodating about 40 trainees of the Inland Fisheries Training Course and 57 residential quarters for various cadres of staff are constructed at a total cost of Rs. 15 lakhs.

(ii) *Culture Fisheries Research*

A small consignment of Chinese Silver Carps (*Hypophthalmichthys*) and Chinese Grass Carp (*Ctenopharyngodon*) have recently been obtained from Japan and Hongkong and experiments on these fishes are in progress at Cuttack Sub-Station.

Shri K. H. Alikunhi, Research Officer, who was on deputation to Japan to study the Culture Fisheries Research and development returned from Japan.

(iii) *Fishing Gear Technology*

The first training course in gear technology viz., Shrimp Trawl Training was commenced from 1st July, 1959 under the supervision of Dr. H. Miyamoto, FAO Gear Technologist. Fishery officials and fishermen from different maritime States of Bombay, Mysore, Kerala, Madras, Andhra and Orissa were deputed for training. Besides the above two nominees from Philippine Government under Colombo Plan also joined the course.

(iv) *Fishing Craft Technology*

The advanced training course in fishing boat designs was commenced from 1st of September, 1959. Nine candidates representing Orissa, Andhra, Madras, Kerala, Mysore and Bombay States and one nominee from Philippine Government under Colombo Plan joined the course. Staff members of Craft branch of the Central Fisheries Technological Research Station also attending the course and the total strength was 14.

Preliminary lectures on the boat design and drawing details were given by Mr. Peter Gurtner, FAO, Naval Architect. Mr. Noria Fujinami, FAO, Naval Architect, Rome who was in Cochin, conducted fuel tests, trial runs and stability tests with 5 types of boats of varying H.P. from 10 to 56 for the benefit of the trainees.

(v) *FAO Fish Processing Expert*

Dr. S. A. Beatty, FAO Expert in Fish Processing who is on an assignment to India to organise the Processing Wing of the Central Fisheries Technological Research Station, arrived in September, 1959 and is getting acquainted with the Fish Processing Industry in this area.

(vi) *F.A.O. Naval Architect for fishing vessels*

Mr. Peter Gurtner, FAO Naval Architect was assigned by the F.A.O. Rome, to advise and assist the Government of India, and State Governments mainly on problems relating to boat design, deck equipment, beach landing crafts, tank tests and for effecting technological improvements of fishing boats.

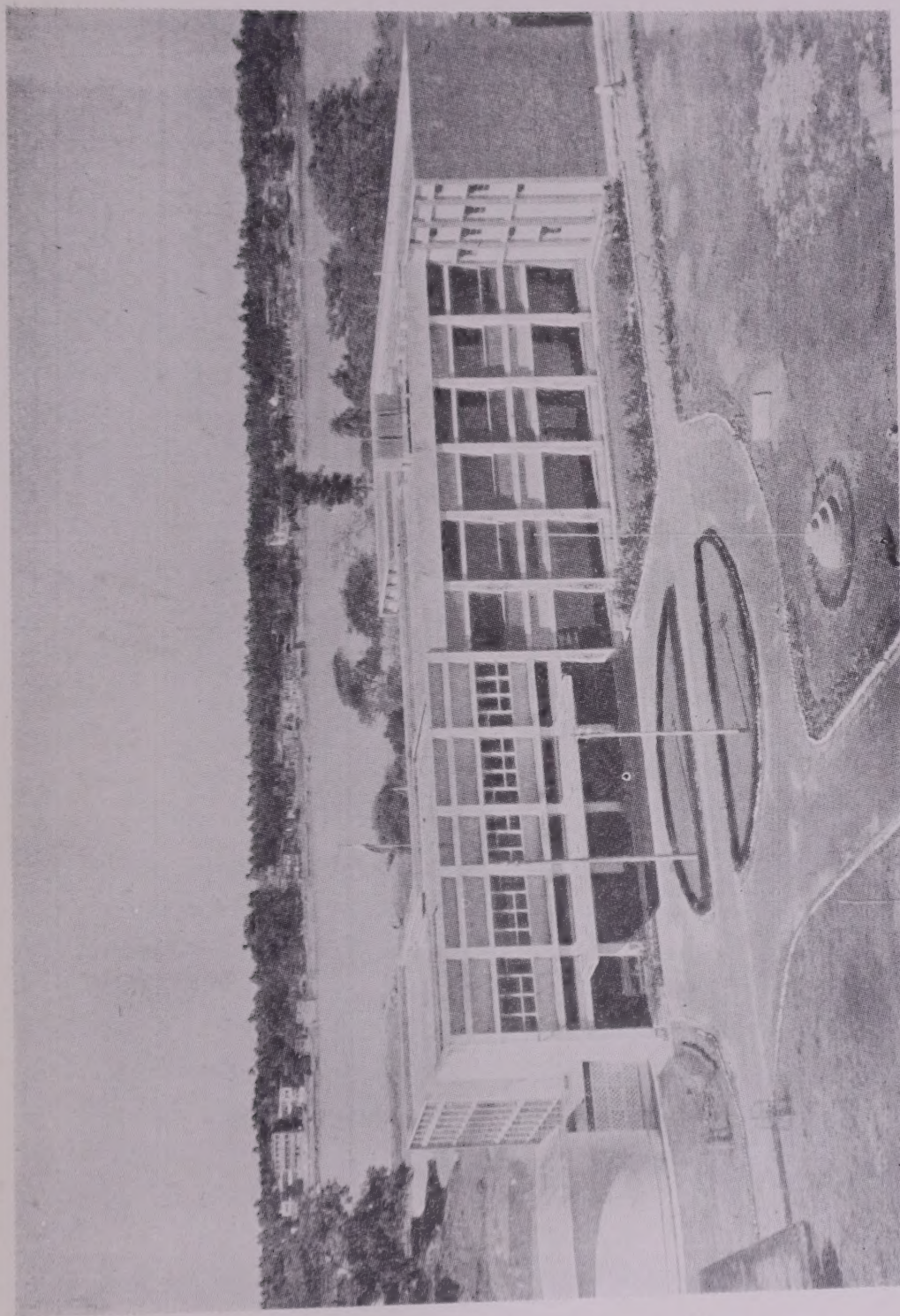
Mr. P. Gurtner, arrived in India in February 1958. Initially he worked for the States of Madras, Kerala, Mysore and Andhra Pradesh. During the latter part of the year, he was assigned to the CFTRS, Cochin, in connection with the running of the Second Training Course for boat design. Mr. Gurtner has effected improvements in the designs of the FAO, 21' surf-loading boat, 24'-7" Pablo type boat, 82' shrimp Trawler and the tug trawler for the Tuticorin Pearl Fisheries to meet the special requirements of fishing in the different areas.

Since 1st January, 1959, the expert has been assigned to the CFTRS, Cochin and is currently in charge of the running of the advanced training course in fish boat designs and construction at this Research Station.

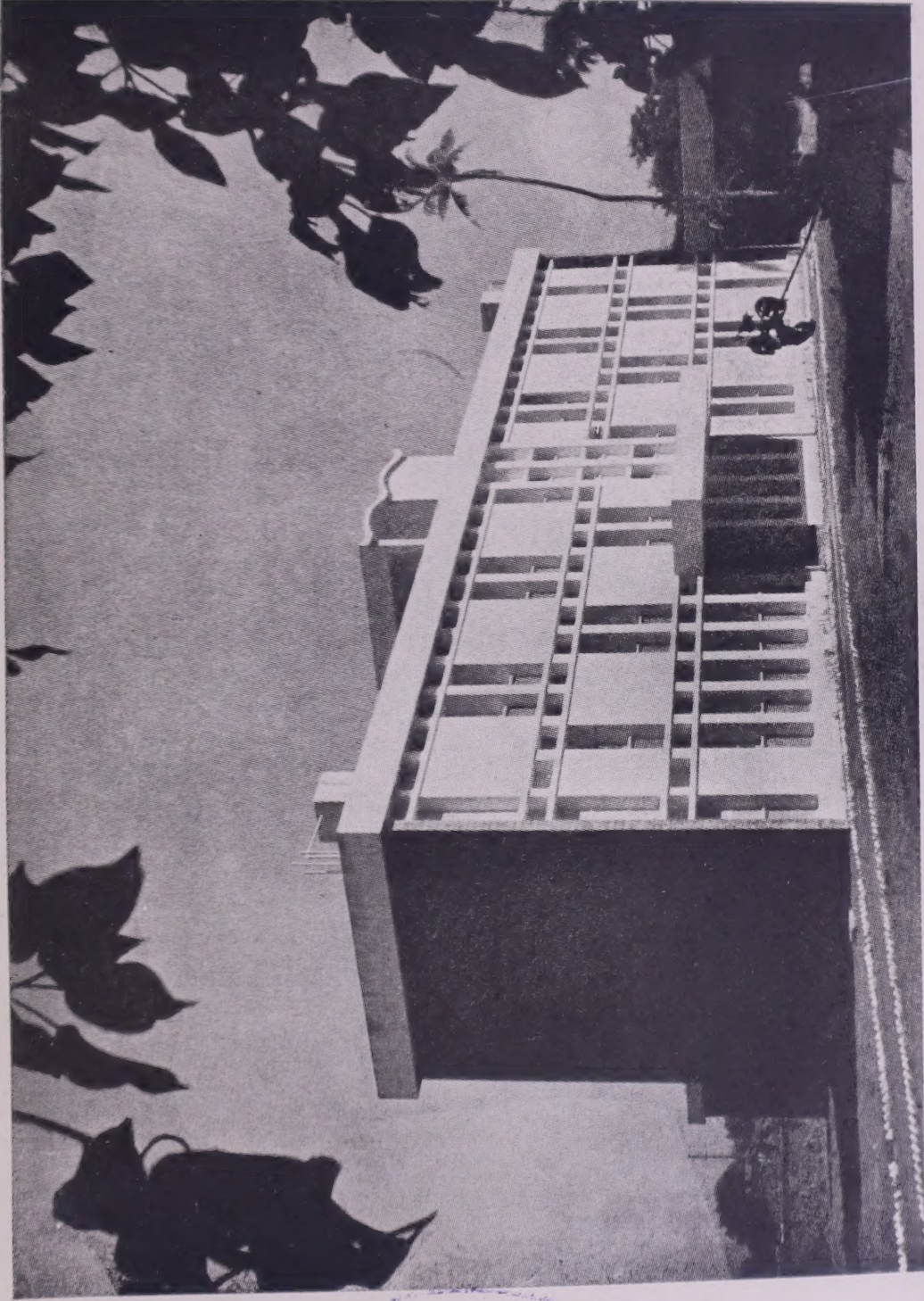
Mr. P. Gurtner, will continue to assist the Govt. of India and the State Governments for bringing about technological improvements in fish boat designs about construction.

(vii) *Training of Boat Builders.*

A regular training course in boat construction and design is being conducted in this Station under the guidance of FAO Naval Architect. Two such courses of 6 months duration were conducted in 1957 and 1958, and at present an advance course for 4 months period is being conducted for the benefit of the candidates who have already preliminary training in boat construction and design during the 1st course in 1957. Most of the candidates for the course are State fishery officials who are already in the field and after the training, will be in charge of the boat building programmes of the respective States. So far 21 candidates have been trained in boat construction and design. A similar course is also proposed to be conducted in 1960.

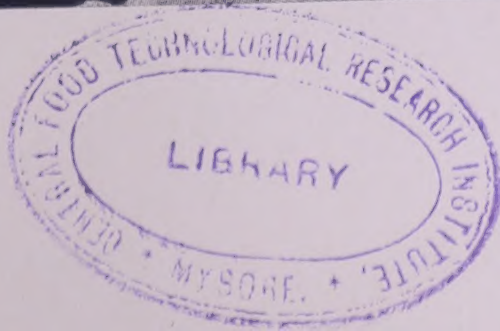


Laboratory of the Central Inland Fisheries Research Station, Barrackpore.



Fisheries Trainees Hostel, Central Inland Fisheries Research Station, Barrackpore.

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